Amendment to the Claims

1. (Currently Amended) A mass flow controller for controlling a mass flow rate, in which a mass flow rate of a fluid is detected by a flow rate sensor and a control valve is operated so as to adjust the detected mass flow rate to a desired value,

wherein said control valve is arranged as a solenoid valve operated by means of a solenoid, and a plunger for opening and closing said solenoid valve is disposed within a cylindrical conduit having a hollow structure, whereby one-way flow of the fluid is effected in a space between an outer circumferential surface of the plunger and an inner circumferential surface of the conduit in a direction of the axis of the cylindrical conduit,

wherein a cylindrical yoke for guiding a magnetic flux generated by the solenoid is disposed in the conduit at a position adjacent to said plunger, said yoke being adjustable with respect to the direction of the axis of the conduit, whereby an initial gap between the plunger and the yoke can be adjusted..

2. (Original) The mass flow controller according to claim 1, wherein the outer circumferential surface of said plunger includes a groove extending in parallel to the axis of the conduit, to thereby provide a fluid flow path.

3. (Original) The mass flow controller according to claim 2, wherein the plunger is made of a magnetic alloy having high anti-corrosion properties.

4. (Original) The mass flow controller according to claim 1, wherein said control valve comprises a spherical valve head attached to a forward end of the plunger and a valve seat corresponding to said valve head, said valve seat being arranged in a funnel-like form.

5. (Original) The mass flow controller according to claim 3, wherein said control valve comprises a spherical valve head attached to a forward end of the plunger and a valve seat corresponding to said valve head, said valve seat being arranged in a funnel-like form.

6. (**Cancelled**)

7. (Original) The mass flow controller according to claim 1, wherein a spherical valve head is attached to one end of said plunger and a yoke having a funnel-like valve seat corresponding to said valve head is disposed adjacent to said plunger with a spring being provided therebetween, to thereby obtain a normally opened valve structure.

8. (Original) The mass flow controller according to claim 1, wherein a doughnut-like permanent magnet is positioned at an outer circumferential surface of said conduit at a position corresponding to said plunger, said doughnut-like permanent magnet being adjustable with respect to the direction of the axis of the conduit, whereby an initial axial force between said plunger and valve seat can be adjusted by the position of said doughnut-like permanent magnet.

9. (**Cancelled**)

10. (**Cancelled**)

11. (Original) The mass flow controller according to claim 1, wherein the flow rate sensor comprises a pressure based flow rate sensor provided in a fluid flow path, so as to detect a pressure generated by the fluid flowing in the space between the outer circumferential surface of the plunger and the inner circumferential surface of the conduit.

12. (Original) The mass flow controller according to claim 11, wherein the pressure based flow rate sensor comprises a nozzle provided at a fluid outlet portion of the mass flow rate controller and a pressure gauge for detecting a pressure generated by the fluid flow at said nozzle.

13. (Original) The mass flow controller according to claim 11, wherein a conduit for detection of pressure is provided at a fluid inlet portion of said fluid flow path, which fluid inlet portion guides the fluid to the plunger, and wherein said pressure based flow rate sensor is provided in said conduit for detection of pressure so as to determine a flow rate, based on a pressure generated by the flow of the fluid along the plunger.

14. (Currently Amended) A mass flow controller for controlling a mass flow rate, comprising:

a cylindrical conduit having a hollow structure;

a solenoid valve comprising a solenoid disposed at an outer circumferential surface of said cylindrical conduit and a cylindrical plunger disposed in said cylindrical conduit so as to extend in a direction of the axis of the cylindrical conduit, said plunger being adapted to be operated by means of said solenoid;

a flow rate sensor for detecting a mass flow rate;

a valve head attached to a forward end of said plunger, said valve head providing a control valve in cooperation with a valve seat facing the valve head, said plunger being adapted to be operated so as to obtain mass flow rate, in accordance with a mass flow rate detected by said flow rate sensor; ~~and~~

a groove formed in an outer circumferential surface of said plunger, said groove extending in the direction of the axis of the cylindrical conduit, so as to effect

one-way flow of a fluid in a space between said groove and an inner circumferential surface of said cylindrical conduit in the direction of the axis of the cylindrical conduit; and

a cylindrical yoke for guiding a magnetic flux generated by the solenoid, said yoke being disposed in the cylindrical conduit at a position adjacent to said plunger, said yoke being adjustable with respect to the direction of the axis of the cylindrical conduit, whereby an initial gap between the plunger and the yoke can be adjusted.

15. (New) A mass flow controller for controlling a mass flow rate, in which a mass flow rate of a fluid is detected by a flow rate sensor and a control valve is operated so as to adjust the detected mass flow rate to a desired value,

wherein said control valve is arranged as a solenoid valve operated by means of a solenoid, and a plunger for opening and closing said solenoid valve is disposed within a cylindrical conduit having a hollow structure, whereby one-way flow of the fluid is effected in a space between an outer circumferential surface of the plunger and an inner circumferential surface of the conduit in a direction of the axis of the cylindrical conduit,

wherein the flow rate sensor comprises a thermal mass flow rate sensor connected in parallel with the conduit, and

wherein a fluid inlet portion of the thermal mass flow rate sensor is connected to a fluid inlet portion formed at an end of the plunger and a fluid outlet portion of the sensor is connected to a fluid outlet portion formed at the other end of the plunger.